NATIONAL ASSOCIATION OF COST ACCOUNTANTS

Affiliated with The Canadian Society of Cost Accountants

Official Publications

Vol. IV, No. 2 September 15, 1922

Woolen Mill Costs

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SEPTEMBER 15, 1922

WOOLEN MILL COSTS

Many woolen mills still use inadequate, unsafe and traditional methods of cost accounting in comparison with other industries such as metal and wood working. Furthermore, more management and cost literature have been devoted to these two latter industries than to the textile industry. But there are evidences of great improvement in woolen mill costing and in textile cost accounting generally.

Accurate results demand the separate calculation and presentation of material, labor and burden costs. Costs that are grouped together are never under proper control. Labor and expense are often lumped and applied on a flat pound basis but this practice makes it impossible to have a continuous comparative knowledge of labor and burden costs by fabrics. Even though these elements are applied separately, the costs are less helpful if the pound is used as the basis of application. Furthermore, labor and expense costs applied at a per pound rate have been found in many cases to be positively misleading and may cause much profitable business to be lost or unprofitable orders accepted.

Labor and burden costs should set forth the operating details by fabrics and by operations. Only in this way can the executive intelligently follow the trend of his costs and promptly locate organization weaknesses.

Standard Costs

The best executive operating control is obtained by using predetermined cost standards. Many mills operate on a quantity production basis and manufacture definitely determined seasonal lines. The various styles are therefore duplicated many times. Obtaining the actual time spent on each lot manufactured would entail a considerable amount of detail and at the same time fail to present the required operating information. While always interesting, costs setting forth the fact that style 609 today cost 88 cents a yard while last week the same style cost 82 cents, are not of the utmost value unless these results can be compared with a predetermined standard showing what the cost of each fabric element should be. Instead of getting reports setting forth the total cost of the various fabrics made, which information is purely historical, the executive should receive a statement reflecting the predetermined standard cost by component elements of the various styles made, together with a comparison of these standards with the actual analyzed results.

The amount of any variations in cost should also be clearly shown. Not only is the actual cost known but a real means is provided of determining whether it is too high and, if so, at what particular manufacturing stage and in what cost element.

From the report mentioned above the executive can grasp readily actual operating conditions. He can tell what the standard cost of each element is and how closely the actual costs of the different responsible divisions approximate the cost standards. Therefore he can find just where the weak points are and determine upon the necessary steps for the elimination of the profit leeches.

In modern woolen mill cost practice the actual time consumed in producing a fabric is not considered as representing the real cost of that fabric. Unless the actual manufacturing procedure changes or the basic commodity prices vary, the cost of producing the same style of fabric at two different periods should be the same. Every one who is acquainted with manufacturing costs knows, however, that this will not hold true and that substantial manufacturing variations are bound to result. These variations, therefore, are treated as operating efficiency gains or losses and not considered as a part of costs.

Classes of Materials

Basic direct materials are of two classes, namely: mix material and non-mix material. The mix material is the stock calculated in the mixing formula and weighed into the mix before picking. It consists of raw wool, raw cotton, shoddy, etc. Non-mix materials include dyestuffs, purchased warp, other purchased yarn, etc., which directly form a part of the finished fabric but which have not yet been included in a manufacturing mix. The classification of materials is very essential from a cost control standpoint.

No particular difficulty exists in accurately deriving the cost of stock comprising any definite lot mixed, because the specific component materials can be traced directly to the purchase records. Furthermore, the quantities of each kind that are mixed in a batch are definitely known. Practically every woolen mill calculates a reasonably accurate mix material cost of any particular batch. The fundamental weakness, however, which appears to be quite universal, lies in the failure of existing cost methods to constantly control and reflect promptly and accurately any variations that arise between these mix material costs as calculated for a particular batch mixed, and the actual cost of all batches mixed which comprise varying grades of raw stock.

The Blend or Mix

When the fabric data has been determined and the standard layout set up, a blend or mix is prepared. This blend shows the grades and classes of raw stock, together with the quantities of each to use, in developing the mix material for a definite fabric. These blends are permanently kept in a blend book in the office and

copies are sent to the picker house. The boss picker also usually records them for future use in case the order is repeated later.

When a certain lot is put in process, the picker house weighs out a "batch" in accordance with the blend. This batch will vary depending upon the local mill practice—sometimes 200, 400, 600, 800, etc., pounds. A batch is called a "mix." A record of the weight of the batch mixed is sent to the office and recorded. Consequently, the quantities mixed on each blend together with the grades and kinds of stock used, are always definitely known and furnish an excellent mix material cost basis.

Calculating the Mix Cost

After the blend or formula has been prepared for a fabric, stock costing approximately a certain price is decided upon for each elemental material which is to enter the mix. It must be known what the material in the fabric should cost before manufacturing starts. Especially is this true if the goods are intended for the competitive trade. Consequently, in deciding to make a fabric the mix material cost calculation is one of the preliminary steps. It is somewhat as follows:

Blend No. 86

	Kind—Filling		*Style* 621.6	
%	*Kind of Stock*	*Quantity*	*Price*	*Amount*
35.0	Wonolancet Special	35	$.30	$10.50
15.0	Slacks No. 203	15	.29	4.35
10.0	J. & Y. Picked Grey	10	.15	1.50
10.0	B. & H. No. 1841	10	.24	2.40
22.5	Slacks No. 19	22½	.36	8.10
7.5	No. 621.6 Waste	7½	.07	.53
100.00	Totals	100		$27.38

Blend No. 87

	Kind—Warp		*Style* 621.6	
%	*Kind of Stock*	*Quantity*	*Price*	*Amount*
75.0	Wonolancet Special	75	$.30	$22.50
25.0	Slacks No. 19	25	.36	9.00
100.0	Totals	100		$31.50

It will be noted that for style 621.6 the filling material costs .2738 cents per pound while the warp pound cost is .3150 cents. These unit prices are now used as representing the mix material cost.

The several materials entering into the two mixes have now lost their identity, since the final mix unit pound costs are used in all cost calculations, and represent the predetermined material standards for the specific fabric.

Dyestuffs

The dyestuffs used in a woolen mill are correctly treated as direct materials rather than as burden supplies. While every

mill man with whom the subject has been discussed has admitted the correctness of this principle, each one has generally questioned the practicability of direct dyestuffs cost application. Since sound theory and manufacturing practice place dyestuffs in the material classification, the cost engineer should so devise his methods that this procedure can be carried out.

A brief analysis of the cost and use of dyestuffs will quickly reflect the importance of correct dyestuffs analysis and application and the fallacy of lumping these total charges and treating them as expense. Take for example two fabrics, one containing 10% stock dyed wool, while the other fabric is dyed in the piece. If dyestuffs are included in burden, each of these fabrics will have very nearly the same amount of dyestuffs cost. Another reason for eliminating dyestuffs from burden is the different cost of varying colored dyestuffs. These elements have a large bearing on the final fabric cost but any variations will not be known unless they are segregated and applied separately.

Definite standard dyestuffs cost for fabrics containing stock dyed material and for those that are piece dyed should be used.

Labor Costs by Operations

Labor costs in the average woolen mill can be obtained best by styles according to manufacturing operations. Operation style costs are much more valuable to the executive in increasing production than order or lot costs.

Operations

While not considered exhaustive, the following operations are found in many woolen mills, carrying the product from the purchased grease wool to the finished fabric: Wool Sorting, Scouring, Carbonizing, Burr Picking, Stock Dyeing, Mix Picking, Carding, Spinning, Spooling, Dressing, Drawing Ends, Weaving, Burling, Sewing, Fulling, Washing, Extracting, Piece Dyeing, Drying and Dry Finishing.

Labor Standards

Possibly no industry lends itself more readily to the use of analytical costs than woolen textile mills. Therefore standard labor costs in each operation by fabrics should be developed. These standards are obtained in various ways. By one method they are developed from a study of past performances. By another method they are established by studying the various products, the flow of production, the operations performed and the speed and capacity of the different machines, resulting in predetermined standard labor times by products and by operations. The latter plan is more satisfactory where applicable.

Control of Labor Variations

Any variations that may arise between the standard rates and the actual operating results must be controlled, otherwise

misleading data may result. To be thoroughly effective, this control will show the actual unit pound or yard labor differences found to exist for each class of yarn or each fabric in every operation. The total value of such variations is then carried through the accounting control as an unabsorbed or overapplied labor variation balance. As a result, two valuable classes of information are available, first, the total labor cost upon the basis of predetermined standards and second, the loss incurred through failure on the part of the mill to meet the standards set or the gain realized by exceeding the standards.

In obtaining continuous labor variations control, the machine and not the man, is considered the producing factor in machine operations. Carding, for example, is strictly a machine operation. Therefore, the operative in this case is treated as an aid to production rather than as the producing element. Accordingly the reports required from carding show the day's results regardless of the men engaged. Form 1 (see page 13), a carding report, provides a means of obtaining carding labor costs and in addition develops machine operating efficiency data.

A labor card that has been found of value in non-machine operations is designed for use with either the operation or special order cost methods. The card consists of six coupons and the time is reported merely by drawing a line through the starting and stopping periods, filling in the data required and detaching the coupon. Indirect labor can also be very satisfactorily reported on this ticket through the use of standing order numbers.

Classes of Burden

Burden is divided into two major divisions—mill burden and commercial expense. Few woolen mills are distributing their burden upon even an approximately correct basis. So much has been written about the importance of accurate burden compilation and application that many attempts at adopting home made versions of modern burden methods have produced some very unsatisfactory and really unsafe results. Burden is capable of being applied to costs just as accurately as the material or labor elements if proper study is devoted to preparing the basic foundation.

Burden Application Centers

The first step in the proper application of burden is to divide the mill into departments or burden centers, which may or may not coincide with the physical manufacturing departments, depending upon the factors of investment, space occupied, production flow, etc. Burden application centers frequently decided upon in a woolen mill are: Dyeing, Picking, Carding, Spinning, Spooling and Dressing, Weaving, Burling and Sewing, Fulling, Wet Finishing, and Dry Finishing.

In addition to these ten centers of burden application the

charges against the following expense departments are usually segregated for purposes of more complete cost analysis and control: Building Space, Power Plant, Stores, Shipping and Mill General.

The first ten centers are direct operating departments, while the remaining five are indirect departments or expense divisions and therefore are not treated as burden application centers. The entire mill expense must ultimately be spread over the output units produced by the ten direct cnters.

Developing Burden Rates

The next step is to obtain a burden expense classification. The following list is suggestive and is taken from the classification of ledger accounts shown in a subsequent section: Superintendence and Foremen, Indirect Labor, Repairs and Maintenance of Buildings, Repairs and Maintenance of Machinery and Equipment, Mill Supplies, Light, Heat and Power, Shipping Department Labor and Expense, Freight and Transportation Charges in Auto and Trucking Expense, General Mill Expense, Insurance, Taxes and Depreciation.

The next step is to obtain expense applicable to each class and to distribute it to the various burden application centers upon some accepted principle. The bases of distribution that may be used are mentioned below.

Superintendence and Foremen—Superintendence—total mill payroll. Foremen can be charged directly to their respective departments.

Indirect Labor—Charge this expense direct to responsible departments.

Repairs and Maintenance of Buildings—Usually floor space.

Repairs and Maintenance of Machinery and Equipment—Machine valuations in the various departments.

Mill Supplies—Charged direct to consuming departments or prorate them according to direct labor.

Light—Obtain the total actual lamps used and their wattage. By considering operating time, lamp variations, etc., reduce to an equalized wattage unit.

Heat—Basis of floor area occupied.

Power—The formula for distributing power expense follows: A—equals number of motors; B—equals H. P. of each motor; C—equals average per cent of maximum load carried; D—equals average hours run per week, and E—equals equalized H. P. operating hours. Therefore, $A \times B \times C \times D = E$.

Shipping Department Labor and Expense—Direct labor.

Freight and Transportation Charges In—Charged to stores division.

Auto and Trucking Expense—Any portion of the auto and trucking expense applicable to hauling purchases will be charged to stores. Transportation out will be charged to freight out account and treated as a deduction from sales.

General Mill Expense—Direct labor.

Insurance, Taxes, Depreciation—These fixed charges must be taken into costs monthly. Charges for each class on buildings are distributed upon the basis of space occupied. Insurance and taxes on machinery are distributed upon the basis of machine values. Depreciation on machinery can be directly charged to the proper departments.

When the predetermined burden has been distributed to the different burden application centers, the total direct labor for each center will have to be obtained. Dividing the total burden for each center by the appropriate direct labor, will give the burden rates by burden application centers. These rates represent the

burden standards and will be used in all cost computations until new standards have been developed.

The direct labor method of applying burden is a very practical one in many mills. It is not considered as scientific as some other plans, such as the machine hour method, but in many cases it will be found more practical because of its simplicity and adaptability. Lack of space makes it impossible to discuss various burden application methods.

Commercial Expense

A commercial expense budget should be set up including the estimates for the year in the administrative and selling divisions. This budget can be very exhaustive or extremely simple depending upon the organization requirements. Large mills having definite responsible office departments make a practice of budgeting the expense of each department. Small or medium size mills frequently content themselves with budgeting the administrative and the selling expense in summarized form.

Commercial expense can usually be distributed best upon the basis of a percentage of total mill cost. Therefore dividing the total commercial expense budget by the estimated mill cost of sales gives the standard commercial expense rate.

Waste

The average woolen mill has very little practical knowledge of waste or how to apply it to costs. Too often the waste is accepted as a necessary evil. Waste cannot be reduced unless it is known. Mere executive surveys will not suffice. Simplified methods of waste determination and control, and an analysis of the waste in the waste making centers, are of paramount importance. Waste standards by fabrics should be determined and simple but effective records kept reflecting the actual waste made by fabrics at each waste making center. Thus the executive will have information showing any variations existing between the actual waste and the amount of waste allowed at the various manufacturing points. By this means all guessing at the amount of waste is eliminated. A waste report is used to record the waste results from mix to yarn. On the heading it shows pounds picked — pounds of yarn spun out = pounds of waste; pounds of waste ÷ pounds of yarn spun out = waste %; and the month. The columns are Lot No., Pounds Picked, Pounds Yarn Spun Out, Waste (Pounds and %). It indicates the elements of a plan applicable to all waste making centers.

Classification of Accounts

A typical woolen mill accounting classification follows:

Assets

Current:

Cash in Office
Cash in Bank
Accounts Receivable

Acceptances Receivable
Notes Receivable
Liberty Bonds

Inventory:
Raw Wool
Raw Cotton
Cotton Yarn
Silk Yarn
Shoddy
Rags
Dyestuffs
Mill Supplies
Office Supplies
Fuel
Work in Process
a—Material
b—Labor
c—Burden
Finished Goods

Fixed:
Land
Buildings
Machinery and Equipment
Mill Fixtures
Autos and Trucks
Office Furniture and Fixtures

Deferred:
Interest Prepaid
Insurance Unexpired

LIABILITIES

Current:
Accrued Payroll
Accounts Payable
Acceptances Payable
Notes Payable
Interest Accrued
Taxes Accrued

Fixed:
Mortgage

Reserves:
Reserve for Depreciation on:
Buildings
Machinery and Equipment
Mill Fixtures
Autos and Trucks
Office Furniture and Fixtures
Reserve for Bad Debts
Reserve for Federal Taxes

Capital:
Capital Stock
Surplus
Dividends
Profit and Loss
Federal Taxes

REVENUE AND EXPENSE

Sales:
Class A
Class B

Deductions from Sales:
Returns and Allowances
Freight Out
Discounts Allowed
Commissions Allowed

Cost of Sales:
Mill Cost of Class A Sales
Mill Cost of Class B Sales
Commercial Cost of Sales

Other Income:
Sundry Sales
Discounts Received
Interest Received

Other Expenses:
Interest Paid

Mill Burden:
Superintendence and Foremen
Indirect Labor
Repairs and Maintenance of Buildings
Repairs and Maintenance of Machinery and Equipment
Mill Supplies
Light, Heat and Power
Shipping Department Labor and Expense
Freight and Transportation Charges In
Auto and Trucking Expense
General Mill Expense
Insurance
Taxes
Depreciation
Reserve for Mill Burden

Administrative Expense:
Officers' Salaries
Office Payroll
Stationery and Office Supplies and Expense
Telephone, Telegraph and Postage
Legal and Accounting Expense
Charity and Donations
Association Dues
Capital Stock Tax
Other Administrative Expense

Selling Expense:
Sales Office Expense
Advertising
Travelling Expense
Credits and Collections
Bad Debts
Other Selling Expense
Reserve for Commercial Expense

MATERIAL CONTROL

For adequate material control an accurate record of stock put in process is necessary. A form used for this purpose has spaces on the heading for the date and the signature of the one who reports material delivered. The columns are From Whom Purchased, Description of Stock, Date Billed, Lot No., Deliveries (by bag number and pounds). At the end of the month the total of each class of material delivered is summarized and the result serves as a

means of transferring the proper values from the raw stock to the mill accounts.

Each month the consumption of indirect material and supplies can be obtained from requisitions or in some other manner, where requisitions are not considered advisable.

Labor Control

The payroll sheets are divided so as to separate the total payroll into direct piece, direct hour and indirect labor. Five weeks' results can be inserted on these sheets without rewriting the employees' names. Each week a payroll analysis is prepared which shows the total departmental analyzed labor, together with the percentages that the indirect labor bears to the direct. At the end of each month, the mill is charged with the actual direct labor whether paid for or accrued. The mill is likewise credited with units of output priced at standard labor rates. In this way a very definite labor control is obtained since any variations will be quickly reflected.

Burden Control

Mill burden accounts are all segregated in one division of the ledger. Therefore the preparation of the condensed burden statement shown in Form 2 (page 14) becomes merely a matter of transferring the current expenses from the ledger accounts to the appropriate divisions of the statement. The columnar form allows for the presentation of the total burden for the month and in addition furnishes a means of comparing each item of expense from month to month. Some of the fixed charges such as taxes, insurance and depreciation which are paid or established at irregular intervals or but once a year are pro-rated on a monthly basis, one-twelfth being charged to the expense accounts each period.

As the burden is applied to costs at standard rates, it now becomes necessary to prove these rates against the actual monthly burden as determined.

Each month the mill is charged, through the accounting control with the standard burden absorbed, which is determined from a consideration of the actual direct labor and the standard burden rates. This absorbed burden is credited to reserve for burden account. By contrasting the actual burden for the month with the standard burden for the same period, the monetary values of burden variations are definitely reflected. Comparative actual and standard burden rates are also constantly shown.

The burden statement shown by Form 2 is a final summary of the total mill burden. Statistical records are maintained reflecting the burden results and variations by expense classes in the various burden application centers.

Any expense variations can consequently be definitely investigated. Thus the application of burden to costs is at all times thoroughly under control.

The commercial expenses are controlled in a manner similar to that described for the mill burden. Each month the actual expenses or accruals are listed on a columnar expense statement and the total is compared through the reserve for commercial expense account with the standard expense applied. This step provides a complete control of expense application to costs. Furthermore it reflects in money values any existing variations between actuals and standards in addition to complete comparative percentages.

Monthly Profit and Loss

The monthly statement of profit and loss is prepared from the accounts represented under the following headings as reflected by the classification of accounts: Sales, Deductions from Sales, Cost of Sales, Other Income and Other Expense. The total of the monthly entries to each of the accounts in these divisions is written on the statement sheet Form 3 (page 15) in the space provided.

As all sales are priced at standard cost, a standard operating result is provided which represents the profit or loss that would have been made if all standards had been met. Next, the summarized material, labor and burden variations obtained from detail analytical schedules are inserted and as a result the actual operating profit or loss is reflected.

Valuable as the conventional monthly profit and loss statement may be its importance cannot be compared from an executive standpoint with the data presented by the plan under discussion. Conventional methods show the profit or loss resulting from the monthly operations, in variously classified totals. Modern cost engineering reflects the profit or loss actually made, the profit or

Card No._____ CARDER'S DAILY REPORT

Reported by_____ Date_____

STOCK	Run	TIME			
		Carding	Clean Up	Repairs	Idle
TOTALS					

Remarks

Form 1 (Size, 5 x 3)

loss that should have been made and the actual variations between the two results analyzed by cost elements in such form that the executive can know the reasons for the differences reflected.

Naturally, monthly operating results of the conventional type are of value. They show the executive which way his business is headed. But—and right here is the great fallacy—they do not show the executive *why* his business is headed in any particular direction. It is knowledge of this nature that is sorely needed by every woolen mill executive, not only in periods of cut-throat competition but at all times.

CONDENSED MILL BURDEN STATEMENT

Folio	*Name*	*January*	*February*	*March*
N1	Superintendence and Foremen	000.00		
N2	Indirect Labor	000.00		
N3	Reprs. and Maintenance of Bldgs.	000.00		
N4	Reprs. and Maintenance of Mchy. and Equip.	000.00		
N5	Mill Supplies	000.00		
N6	Light, Heat and Power	000.00		
N7	Ship. Dept., Labor and Expense	000.00		
N8	Freight and Transp., Charges In	000.00		
N9	Auto and Trucking Expense	000.00		
N10	General Mill Expense	000.00		
	Total Controllable	000.00		
N11	Insurance	000.00		
N12	Taxes	000.00		
N13	Depreciation	000.00		
	Total Fixed	000.00		
	Actual Burden this Month	000.00		
	Actual Burden to Date	000.00		
N20	Standard Burden this Month	000.00		
N20	Standard Burden to Date	000.00		
*Sch. 4	Burden Variations:			
	This Month	000.00		
	To Date	000.00		
E1	Actual Labor this Month	000.00		
E1	Actual Labor to Date	000.00		
B16	Standard Labor this Month	000.00		
B16	Standard Labor to Date	000.00		
	Actual Burden Rate this Month	000.00		
	Actual Burden Rate to Date	000.00		
	Standard Burden Rate	000.00		

Form 2

*Schedule 4 summarizes the detailed variations by burden classes and by burden application centers and carries the final result to profit and loss.

CONDENSED PROFIT AND LOSS STATEMENT

Folio	*Name*	*January*	*February*	*March*
	SALES:			
J1	Class A	000.00		
J2	Class B	000.00		
	Total Gross Sales	000.00		
	DEDUCTIONS FROM SALES:			
K1	Returns and Allowances	000.00		
K2	Freight Out	000.00		
K3	Discounts Allowed	000.00		
K4	Commissions Allowed	000.00		
	Total Deductions	000.00		
	Total Net Sales	000.00		
	COST OF SALES:			
L1	Mill Cost of Class A	000.00		
L2	Mill Cost of Class B	000.00		
	Total Mill Cost	000.00		
L4	Commercial Cost of Sales	000.00		
	Standard Operating Profit	000.00		
	OPERATING VARIATIONS:			
	Unabsorbed or Overapplied:			
*Sch. 1	Mix Material	000.00		
Sch. 2	Non-Mix Material	000.00		
Sch. 3	Direct Labor	000.00		
Sch. 4	Mill Burden	000.00		
Sch. 5	Waste	000.00		
Sch. 6	Commercial Expense	000.00		
	Total Operating Variations	000.00		
	Actual Operating Profit	000.00		
	OTHER INCOME:			
M1	Sundry Sales	000.00		
M2	Discounts Received	000.00		
M3	Interest Received	000.00		
	Total Other Income	000.00		
	Operating Profit and Other Income	000.00		

* Schedules 1 to 6 inclusive summarize the detailed variations that arose during the month in each cost element.

	OTHER EXPENSE:			
M6	Interest Paid	000.00		
	Net Profit this Month.....	000.00		
	Net Profit to Date.....	000.00		
	% on Gross Sales	00.0		
	% on Net Sales	00.0		
	% on Mill Cost	00.0		
	% on Total Cost	00.0		

Form 3